Missouri Department of Natural Resources

Notes from Nutrient Criteria Technical Subcommittee – September 20, 2012

In Attendance: Nick Bauer, St Louis MSD; Robert Brundage, Norman, Comley & Ruth, PC; John Hoke, MDNR-WPP; Mark Osborn, MDNR-WPP; Steve Taylor, MO-AG; Ken Tomlin, DNR-PDWB; Phil Walsack, MPUA; Chris Zell, Geosyntec.

On Conference Telephone: Peter Goode, Washington U/MCE; Jeff Robichaud, EPA Region VII.

Issues with Drinking Water Reservoirs: Ken reported that compliance problems are widespread among facilities that use reservoirs as a drinking water source, including problems with trihalomethanes and other disinfection by-products. He does not have specific information concerning taste and odor problems, as that is not an issue that is regulated by the program. He will coordinate with Mark to provide more specific information concerning source water problems that are associated with individual reservoirs.

Mark discussed a presentation by the City of Springfield at the August, 2012 MPUA conference, in which drinking water sources (McDaniel and Fellows Lakes) are analyzed for algae species and geosmin concentrations, as well as nutrients. In answer to a follow-up question, Todd Brewer, the presenter, stated that problems in maintaining drinking water quality tend to intensify when total phosphorus concentration in the lakes goes above 20 μg/L.

Inclusion of TN and TP Criteria in Rule: There had previously been discussion of confining the criteria to chl-a, and treating TN and TP as targets that would not be treated as regulatory. Mark reported that such an approach would probably not be approvable. He cited correspondence from EPA to the Association of Clean Water Agencies (ACWA) as well as to the State of Nebraska that confirmed this. He also pointed out that in northern Missouri Lakes, chl-a is not a reliable response indicator. The turbidity that is associated with high nutrient concentrations tends to block the sunlight that is essential to algae growth.

This provoked a lengthy debate concerning the implications. Robert expressed deep skepticism of the concepts behind the rule. What harm, he asked, do high nutrient levels cause to aquatic life if turbidity is blocking algae growth? Mark responded that the high turbidity in itself is an unhealthy situation, and it is strongly correlated with high nutrient levels.

Phil commented on the number of lakes that were estimated to be in violation of the proposed criteria and expressed concern about the expenses that such listings would impose on communities throughout the state. He wondered about the number of lakes that had not been sampled or assessed, and how much expense this would cause further down the road.

Steve expressed concern about the impact that listing Mark Twain Lake would have on agriculture in a large segment of northeastern Missouri. And Chris asked whether the basic or alternative criteria for TN or TP would be applicable if there were not sufficient Chl-a data available. Mark replied that it would probably be the more conservative criteria, but such a scenario was not likely since almost all data collection by the Statewide Lake Assessment Program Missouri Lake Volunteer Program include analysis for chlorophyll. Data from other entities could conceivably be used for assessment, but so far it has not.

Revised Derivation of Proposed TN and TP Criteria: Mark presented a series of regressions that were more detailed than what had been shown previously. They were based on the annual geomeans of individual lakes for TP and TN concentration (independent variables), and Chl-a concentration (dependent variable). The data were separated by lake classification and eco-region. The previously presented regression had been based on overall geomeans of lakes, not separated by regions. A few of the regressions, notably for the L2 lakes and the L1 lakes in the Ozark Highlands, were slightly deficient due to low quantities of data. However, they all supported a strong chl-a response. The minimum R^2 for TP was 69.1% and for TN it was 58.3%.

Numeric nutrient criteria are derived from these relationships using 50% prediction intervals. The normal criteria are defined by the point where the chl-a limit for the lake classification and region intersects the upper (75^{th} percentile) line of the prediction interval. The alternate criteria (applicable if the lake is in compliance with chl-a criteria for three consecutive years) are defined by the point where this intersection occurs at the lower (25^{th} percentile) line. This is at a higher point along the x axis. This model is based on what EPA used for the Florida nutrient criteria for lakes.

Most of the criteria that resulted from this model were pretty close approximations of those that are in the proposed rule. Mark will continue to refine the weaker ones in order to strengthen the case for it.